Dissertation on

A CROSS-SECTIONAL STUDY OF PREVALENCE OF ANAEMIA AMONG RURAL ADOLESCENT GIRLS OF TAMIL NADU

Submitted in partial fulfillment for

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CERTIFICATE

This is to certify that the dissertation work on **"A CROSS-SECTIONAL STUDY OF PREVALENCE OF ANAEMIA AMONG RURAL ADOLESCENT GIRLS OF TAMIL NADU"** is the bonafide work done by **Dr.M.Vijayalakshmi** in the Institute of Community Medicine, Madras Medical College, Chennai–600 003 during the year 2006–2009 under my supervision and guidance in partial fulfillment of the regulation laid down by The Tamil Nadu Dr.M.G.R Medical University, for the **M.D., Community Medicine branch XV examination** to be held in March 2009.

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DECLARATION

I, **Dr.M.Vijayalakshmi**, declare that I carried out this work on, **"A CROSS-SECTIONAL STUDY OF PREVALENCE OF ANAEMIA AMONG RURAL ADOLESCENT GIRLS OF TAMILNADU"** at the Institute of Community Medicine, MMC during the period February to May 2008. I also declare that this bonafide work or a part of this work was not submitted by me or any other for any award, degree, diploma to any university, board either in India or Abroad.

This is submitted to the **Tamil Nadu Dr.M.G.R. Medical** University, Chennai in partial fulfillment of the rules and regulations for the M.D Degree examinations in Community Medicine.

Place : Chennai

Date : . Signature

CONTENTS

ABBREVIATIONS USED

WHO- World health organization

UNICEF- United nations international children's emergency fund

UNFPA-United nations fund for population activities

RCH – Reproductive and child health

Hb – Haemoglobin

IDA – Iron deficiency anemia

ICDS- Integrated child development scheme

PHC- Primary health centre

IFA – Iron and folic acid

HSC – Health sub centre

NFHS- National family and health survey

INTRODUCTION

World interest in adolescent health issue has grown dramatically in the past decades beginning with the international year of youth in 1985 and WH assembly in 1989, when discussion were focused on health of youth.[1]

Adolescence is the period of transition between childhood and adulthood. Adolescent is defined by WHO as a person between 10-19 years of age. There are about 1.2 billion adolescents worldwide and one in every five people in the world is an adolescent [2]

Adolescence is a phase of rapid growth and development during which physical, sexual and emotional changes occur. Adolescents are not homogeneous group and their needs vary with their gender, stage of development, life circumstances and the socio economic conditions in which they live.

WHO, along with its partners, UNICEF and UNFPA, advocate an accelerated approach to promote the health and development of adolescents and young people in the second decade of life.

Adolescence represents a real opportunity to make a difference in lifelong pattern. As on March 2001, adolescents account for 22.8% of the population of India. There are around 239 million adolescents in India in the age group of 10-19 years presently.[3] over the next two decades the number of adolescents is likely to increase further. Among adolescents, girls contribute a vulnerable group, particularly in developing countries where they are traditionally married at an early age and exposed to a greater risk of morbidity and mortality. Adolescent girls up to the age of 19 compromise about ¼ of Indian population. They are estimated to be around 105 million in India [4].

Adolescence is marked as a period of growth spurt and maturation. Extent of physical growth is not determined by genetic, heredity factors alone but also on availability of adequate nutrition, micronutrients in the diet and access to health services.[5] Extra nutritional requirements include increased intake of calcium, iron, iodine, minerals and proteins. Inadequate nutrition during adolescence can have serious consequences throughout reproductive years and beyond. Unmet nutritional needs lead to several public health problems such as stunted and retarded growth, impaired mental development, anaemia, complications during pregnancy and low birth weight babies[5].

Adolescents as they mature cognitively, the mental functioning process becomes analytic, capable of abstract thinking leading to articulation and independent ideology. These are truly the years of creativity, empathy, idealism and with bountiful spirit of adventure. Thus, if nurtured properly youth can be mobilized to contribute significantly to national development.

Anaemia in this age group has been identified as an important public health problem[6]. Anaemia in this age group contributes to high maternal mortality rate, high incidence of low birth weight babies, high post neo natal mortality, fetal wastage, and consequently high fertility rates. This phase of life is also important due to the ever increasing evidence that control of anaemia in pregnant women may be much more easily achieved if satisfactory iron status can be ensured during adolescence.[7.]

Nutritional anaemia is the commonest of all anaemias in the adolescence especially in developing countries like India. Iron deficiency anaemia is a major nutrition problem in India[8]. Iron deficiency anaemia is common in adolescents and children compared to adults. During adolescence, the growth spurt increases the need for iron and for girls there is further increase due to regular menstrual blood loss.

A 2000-2001 Survey conducted by the National Nutrition Monitoring Bureau (NNMB), India in the rural populations of nine states showed that the median intake of nutrients was less than the Recommended Dietary Allowance (RDA) for all age groups of adolescents and in both sexes. The average diet was also grossly deficient in micronutrients. More than 80% of adolescents were getting less than 50% of their daily dietary requirements of vitamin A, more than 70% had their diets deficient in iron by more than 50%of RDA and more than half of the boys and girls surveyed got lessthan50% of the required calcium. The nutrient deficit was higher than the total energy deficit, suggesting that the qualitative aspect of the diet was more of a problem than the quantitative[9]. A multi-centric study by the Indian Council of Medical Research showed that over 90% of adolescent girls throughout the country had some kind of anaemia. These findings were corroborated by district level household survey (DLHS-RCH) in2002-2003 showing that only 5% of adolescent girls did not have any kind of anaemia and a large proportion were suffering from severe anaemia.

The National Family and Health Survey 1998-99 showed that prevalence of anaemia was highest (56%) among ever married adolescents aged 15-19 compared to older ever-married women of reproductive age, though more than half of older women were also suffering from anaemia .Anaemia is likely to adversely affect physical work capacity and cognition in young adolescents girls.

The government of India has made adolescence health as a part of RCH package since 1997.

OBJECTIVES

1. **TO STUDY THE PREVALENCE OF ANAEMIA AMONG ADOLESCENT GIRLS OF AGE 10-19YRS OF PONTHAVAKKAM HEALTH SUB CENTRE, KATCHUR PHC, TIRUVALLUR DISTRICT.**

2. **TO FIND OUT THE POSSIBLE FACTORS ASSOCIATED WITH ANAEMIA AMONG THESE GIRLS.**

JUSTIFICATION

1 .ADOLESCENTS- A SPECIAL GROUP

Adolescents are a **special group** with special characteristics, [10] due to spurt in growth and sexual maturity, having **higher demand** for special nutritional consumption. As the changes occur in physical, psychological and social aspects, it is of imperative importance to assess their physical and mental status during their adolescent phase.

2. ANAEMIA IN ADOLESCENT GIRLS-THE VULNERABLE POTENTIAL MOTHERS

The adolescent girls constitute an area that is not well researched and there is need to investigate their basic health needs. Adolescent girls are a vulnerable group who are **potential mothers** and future home makers. Large numbers of adolescents are under nourished and problem is more among girls (45%) than boys (20%) primarily due to deep rooted gender discrimination[11].If they continue to face the constraints of nutritional inadequacy, it will result in high maternal mortality and morbidity. During adolescence, the growth spurt increases the need for iron and for the girls there is further increase due to regular menstrual blood loss. In the developing countries, the high iron demands in these groups are not met, mainly because of poor diet of low iron bio-availability and frequent parasitic infestations thereby leading to high incidence of anaemia in adolescent girls and women. An adolescent who conceives soon after menarche is likely to start pregnancy with depleted stores. **Adolescent pregnancies are common in India and anaemia is one of the serious health problems** for adolescent girls. There are over 10 million pregnant adolescents and adolescent mothers in India, with one in six girls age 13-19 beginning childbearing[12].

3. RURAL ADOLESCENT GIRLS-THE UNDER SERVED GROUP

Lifestyle of rural adolescents is quite different from that of urban adolescents. The routine of a pre-adolescent/adolescent rural girl is demanding-cleaning the house, cooking, washing, fetching water and bathing younger siblings. Rural girls rarely pursue education beyond primary school level. Early marriage as a trend is common even now, both for boys and girls in rural India. In India 50% of Women aged 20-24 yrs are married before 18 yrs with rural percentage of 58.6%in sharp contrast to urban percentage of 27.9% (NFHS 1998-1999). **For young girls in rural India, poor nutrition, early child bearing, and reproductive health complications compound the difficulties of adolescent physical development**. Anaemia is one of the primary contributors to maternal mortality (20-25%) and is associated with compromised pubertal growth spurt and cognitive development among girls aged 10-19. Nutritional deprivation, increased iron demand for adolescent growth, excessive menstrual losses of iron and early/frequent pregnancies aggravate and exacerbate pre-existing anaemia and its effects. Most girls are not adequately aware of their increased nutritional needs for growth (especially increasing their food intake to meet calorie demands of pubertal growth), resulting in girls who are underweight and of short stature. Fifteen percent of ever-married adolescent girls are stunted; 40% have a body mass index below 18.5, and 20% have moderate or severe anaemia[13] .

The poor nutritional status of these adolescent mothers **heightens obstetric risk during pregnancy and childbirth, contributes to maternal mortality, and puts their infants at risk.** Neonatal and infant mortality rates among adolescent mothers are 60% higher than among infants born to mothers in the 20-29 age groups[14]. **To plan effective intervention it is important to understand the epidemiology.**

In view of the above reasons, this study of prevalence of anaemia and the possible associated factors among adolescent girls of age 10- 19 yrs of PONTHAVAKKAM health sub centre was conducted.

REVIEW OF LITERATURE:

Adolescents

WHO states," Adolescents between 10 and 19 years of age are often considered as young people with special needs. Rapid physical, emotional and social changes are taking place in their bodies and lives. Adolescents find themselves exposed to a host of factors that can adversely affect their health. The female adolescent is especially vulnerable in South East Asia region."[15]

Anaemia

Is a reduction in either the volume of red blood cells or the concentration of hemoglobin in a sample of venous or capillary blood when compared with similar values from a reference population.[16]. It is caused by malnutrition in its widest area.

Nutritional anaemia

It is the commonest of all anaemias among adolescents in India. It may be defined as a condition that results from the inability of the erythropoietic tissue to maintain a normal Hb concentration on account of inadequate supply of 1 or more essential nutrients.[17]. Iron deficiency anaemia (IDA) is the most wide spread micro nutrient deficiency in the world affecting more than a billion people[18].

Causes of Iron deficiency anaemia [19]

1. Inadequate dietary in take
2. Low dietary availability.
3. Increased iron needs during pregnancy and period of growth such as adolescence.
4. Chronic blood loss due to parasitic infestations such as hook worm.
5. Impaired iron utilization in chronic and repeated infections like Malaria and Urinary tract infections.
6. Puberty mennorhagia.

Factors influencing high prevalence of anaemia [20.]

-socio economic status.

-Dietary patterns.

-Poor hygiene and nutrition.

-Educational back ground.

-Prevalence of recurring infections.

-Worm infestations in the population.

-Accessibility to health care facilities.

-Prophylaxis programme.

Iron metabolism [21]

Sources

There are 2 types of iron, haem and non haem iron .haem iron is a constituent of Hb and myoglobin and is present in meat, fish and in blood products .Non haem iron is found to varying degrees in all foods of plant origin. Besides the food, the diet may also contain exogenous iron originating from the soil, dust, and water or cooking vessels.

Absorption

The absorption of dietary iron is influenced by the amount and chemical form of iron, the consumption of factors enhancing or inhibiting iron absorption and the health and iron status of the individual .Iron absorption occurs from the duodenum. Iron absorption is increased with decreased iron stores, increased erythropoietin activity and during pregnancy. The factors like ascorbic acid, meat, poultry, fish and low ph enhance non haem iron absorption. Factors like phytates and tannins inhibit non haem iron absorption.

Iron requirements[7]

A dietary intake of iron is needed to replace the iron lost in stools, urine and during menstruation in women. Average of 1.25 mg / day is lost during menstruation.

For adolescent girls

1-<12 yrs=1 mg/day

2.13-16yrs=2.4 mg/day

3. >16yrs= 2.8 mg /day

Dietary absorption of iron for adult men, children and adolescent boys is 3%. For adult women and adolescent girls is 5%, and for pregnant women it is 8%

Effects of Iron Deficiency [22]

In children and adolescents

1. Impaired motor development and co ordination.

2. Impaired language development

3. Psychological and behavioral effects like inattention, fatigue etc.

4. Decreased physical activity.

5. Defects in cell mediated immunity and increased susceptibility to infection.

Assessment of iron status [23]

The individuals begin to suffer from the adverse effects of iron deficiency well before they become frankly anaemic. Three stages of iron deficiency have been described.

First stage : decreased storage of iron without any detectable abnormalities.

Intermediate : iron stores exhausted, but anaemia has not occurred.

Third stage : iron deficiency with a decrease in the concentration of circulating Hb.

Changes in the Hb concentration, serum iron, transferrin saturation, and erythrocyte protoporphyrin and marrow sideroblast occur after the iron stores are depleted. All the tests that are used to identify iron deficiency have some or other limitation. However, cost effective screening method is to use Hb values at field.[24.]

There are several **laboratory techniques** for measuring Hb%. The techniques in common use are the

1. CYANMETHAEMOGLOBIN.

2. OXYHAEMOGLOBIN

3. ALKALINE HAEMATIN METHOD.

Cyanmethaemoglobin method[25] has become the most popular of the three because it measures practically all haemoglobin except sulfhaemoglobin and the standards used remain stable for a long time.

The detail of estimation of Hb is given in appendix.

Anaemia In Adolescent Girls

Wardlaw etal (1994) stated that iron deficiency appears in girls after they start menstruating and about 12% of adolescents have low iron stores.

Chaturvedi et al (1996) stated that in rural Rajasthan prevalence of anaemia was 73.7%. among 941 adolescent girls studied.

Raja rathinam et al (2000) documented a high prevalence of anaemia {54.2%} in girls who had attained menarche (15-19yrs). Poor hb levels too can be a major cause of delayed menarche.

Shoba and sharadha [26](2003) showed a prevalence of 83% anaemia among adolescent girls of low socio economic growth in Ranga reddy district of Andhra Pradesh.

Anusha sharma et al (2000) stated that the prevalence of anaemia was 85.4% among adolescent girls in rural part of Rajasthan.

Kotecha et al and Agarwal reported a prevalence of 74.7% and 47.6% respectively.

WHO and UNICEF has suggested that the problem of anaemia is of very high magnitude in a community where prevalence rate exceeds 40% [27].

Wardlaw et al (1994) stated that IDA appears in girls after they start menstruating and about 12% of adolescents have low iron stores.

Taniguchi et al (1991) found that among 781 female adolescent students, there were 41 students of IDA, 209 with latent iron deficiency and 30 with other anaemia.

Dallman et al found the prevalence of anaemia in adolescent girls to be highest in 15-17 yr old, who are menstruating.

Rawat; Garg et al (2001) [28]studied the socio demographic correlates of anaemia among adolescent girls of Meerut and found that prevalence of anaemia was significantly higher among girls belonging to joint family than those belonging to nuclear family. Socio economic status, occupation of the father, & literacy of mother had significant association with anaemia prevalence.

Kaur et al (2006) [29]studied the epidemiological correlates of anaemia among adolescent girls of rural Wardha and found that socio economic status, history of excessive menstrual bleeding, vegetarian diet and h/o of worm infestation were strong predictors for prevalence of anaemia.

Gwarika et al (2006) [30]found a high prevalence of anaemia among girls belonging to lower economic group of Ujjain city and girls over the age of 14 had high prevalence of anaemia.

Verma et al (1998) [31] also quoted that compared to non-vegetarian girls (38%); more vegetarians (65.9%) were anaemic.

Niemann et al (1992) stated that low caloric consumption & poor food choices make it difficult for adolescent girls to ingest the level of nutrients needed during their high growth period and time of sexual maturation.

Hal burg (1995) reported that teenagers in an attempt to reach personal goals, they eat dangerously little, select just a few items and frequently skip the meals altogether

Tolonen (1990) stated that the haem iron from animal products is absorbed more than twice as efficient as non haem iron in plant products. The adolescent girls need adequate iron, calcium& magnesium intake especially after puberty when menstruation begins.

Lynch (2000) stated that among anaemic women, menstrual disturbances like menorrhagia or phases of amenorrhoea take place.

Shaw (1996) revealed that general fatigue is the most common symptom of IDA. In addition, girl might appear pale, have head ache, poor concentration and increased susceptibility to infections and diseases, feel lethargic or week, have a poor appetite or be short of breath.

According to Reilly et al (1997) oral iron therapy is the best form of treatment. It is safe, economical and is as effective as parentral route. Ferrous salts are better absorbed than the ferric salts and are most widely used in therapy. Dose of iron for treatment is 3mg/kg/day. Adolescents need 60 mg of elemental iron for mild anaemia and 120mg/day for moderate and severe anaemia.

According to Prasad et al (2000) the absorption from a single dose of iron reduces from 30-40% on first day to as low as 3-6% after a few days of continuous daily administration.

Jonathan (2000) indicated the importance of including adolescents in the risk group to improve their iron status and the need for planning intervention programmes that would increase the Hb levels among adolescent girls through prophylaxis treatment, dietary modifications and helminthic control.

Garcia et al (2000) stated that in areas where haem iron intake is low, ascorbic acid is an important promoter of iron absorption from diet. Addition of 50 mg of vitamin c daily is reported to double the iron absorption.

Programmes for adolescent girls

Reproductive and Child Health Programme (RCH)[32]

One of the major elements of RCH Programme is Reproductive Health Services for adolescents. Teenage pregnancies, behavioural problem and nutritional requirement of adolescents are the major concerns of the planners, because it is directly and indirectly affecting reproductive health of the community.

Education of the girl child, delaying age of marriage and health problems in adolescent girl are the priority area of the government for which many innovative schemes are proposed.

Scheme for Adolescent Girls in ICDS[33]

There was a gap in between women and child age group that was not covered by any health and social welfare programme, where as girls in this group need special attention. The Department of Women and child development, ministry of human resource development launched a scheme for adolescent girls in ICDS in 1991.

All adolescent girls receive the following common services

1. Watch over menarche.
2. Immunization
3. General healths check ups once in 6 months.
4. Treating for minor ailments.
5. Deworming.
6. Prophylactic measures against anaemia, goiter, and vitamin A Deficiency etc.
7. Referral to PHC/ District Hospital in case of acute need.

This scheme for adolescent had been extended to 3.51 lakhs adolescent girls in 507 ICDS blocks.

Control of Anaemia Among Adolescent Girls In Tamilnadu (2002)

1. Supply of IFA tablets every Thursday to all adolescent girls.
2. Health education to these girls through ICDS.

Though the control of anaemia by haematinic supplementation for all adolescent girls in India has been implemented under RCH programme, the prevalence of anaemia still remains high among them. The reasons for this may vary but general problems are:

1. Logistics to ensure availability and distribution of tablets in PHC settings as well as inadequate supervision of providers. (UNICEF: 1998).

2. Problem of compliance with prophylactic medications. (Mc Guire, 1994)

3. Multifactorial cause of anaemia that cannot be addressed by iron supplementation alone (Meda et al., 1996)

Thus **WHO recommends local studies for each region to provide base line information for design of prophylactic and therapeutic regimen[6].**

METHODOLOGY

STUDY DESIGN

This study was done as Cross-sectional[34] descriptive study involving all adolescent girls aged 10-19 yrs.

STUDY AREA

Katchur PHC of Tiruvallur District was selected randomly It is situated about 60 kms from Chennai. Has 6 health subcentres attached to it.

Ponthavakkam HSC was selected by simple random selection. It covers 5 villages. Total population is 5645. Enumerated adolescent girls population is 413. Adolescent male population is 432. 2 of the girls refused to participate. 411 of the adolescent girls willing to take part were included in the study.

STUDY PERIOD

This study was conducted between February 2008 to May 2008.

SAMPLE SIZE CALCULATION

Taking 52% prevalence [4] as "index prevalence' sample size calculated:

$N = 4pq/d^2$ p = prevalence =52%

$= \frac{4 \times 52 \times 48}{5.2 \times 5.2}$ q = (100-p) = 48%

d = precision value = (10%of p) =5.2

= 369

Whole population of adolescent girls of age 10-19yrs from the HSC willing to take part in the study were taken as samples (411).

Inclusion criteria

All adolescent girls of age 10-9 yrs. of the HSC who were willing to participate

Exclusion criteria

- Girls who were not willing to participate
- Girls not belonging to the HSC
- Girls with any other bleeding disorders

DATA COLLECTION

A pretested interview schedule on socio demographic profile was prepared with the help of guide. Pretest was done with 30 girls from Nemam PHC, Poonamalle Block.

At the start of interview, the purpose of the study was explained to the participants. The girls were interviewed at their houses in all the villages covered under Ponthavakkam HSC.

Clinical examination was done initially to rule out cardiac problems[35], history of bleeding tendencies and any other associated illness were noted down. The girls were informed of the check ups and were provided with the curative services if needed.

Height and weight measurements were included.

After getting oral consent, the left middle finger was cleaned with cotton and with the help of sterile needle finger prick was made. After wiping out the first few drops, with the shali's pipette .02ml of blood was collected and mixed well in the 5ml test tube which contains 5ml of Drabkin's fluid and labelled .Hb estimation was done at the PHC laboratory with the help of lab technician.

ANALYSIS

Data entry was made in the excel software in codes and Analysis was done with SPSS-10 computer package. Prevalence was expressed in percentage and associations with the factors were tested for significance using chi square test and odds ratio.

DEFINITIONS

1. **Anaemia-**

WHO criteria for diagnosis of anaemia: [36]

AGE / SEX GROUP	Hb gm/dl
6 months- 4 yrs	<11
6 yrs- 14 yrs	**<12**
Adult males	<13
Adult females	
Non pregnant	**<12**
Pregnant	<11

Anaemia further **sub divided** on the basis of Hb levels.

ANAEMIC STATUS	Hb LEVEL gm/dl
SEVERE	**<7**
MODERATE	**<7 to 9.9**
MILD	
FOR PREGNANT	10- 10.9
For Non Pregnant	**10 -11.9**

Hb estimated by cyan methaemoglobin method[37].

Menstrual Problems [38] Included

1. Dysmennorhoea
2. Menorrhagia
3. Irregular menstrual cycle

Height

The height was recorded with the individuals against the height scale measured in meters. The upper limit recorded to the nearest single decimal point was taken as the height of the individual.

Weight

Weight was recorded with standardized weighing machine without foot wear. Zero error was checked before each recording.

BMI : { Body mass Index}

Calculated Using Formula:

BMI=Weight in kg/ height in meter^2

Under nutrition was considered when the score was below 18.5 by Quetlet's body mass index.[39]

SOCIO DEMOGRAPHIIC PROFILE included father's and mother's literacy level, occupation, per capita income, [40] type of family, birth order, type of house, sanitation facilities and diet pattern.

BACK GROUND INFORMATION

Ponthavakkam HSC covers **5 villages**.

1. **Ponthavakkam**

2. **Nanthimangalam.**

3**. Puduchery**

4. **Prasana Rameswaram**.

5. **Ananthari**

Total population covered **5645**.

Number of males – 2841**.** Number of females- 2804.

Enumerated number of adolescent girls – **413**.All adolescent girls were taken for the study. Only 2 of them refused to take part in the study. **411** participated in the study. Age taken as per the words of the girls themselves as most of them were in schools. More than 80% of them were in schools and were taking their noon meals at the school. Rice had been the main constituent of their diet. They did not use foot wear regularly and more than 80% of them practiced open air defaecation. Less than 40% of them had the habit of washing hands before taking food and after defaecation. Around 88% of their fathers and 66% of their mothers were agricultural laborers.

On physical examination, any associated findings were noted down.

At the end of the study, girls were given health education and those who needed treatment were referred to the PHC.

RESULTS AND DISCUSSION

1 Socio Demographic Characteristics

1.1 Age Distribution of Girls

The numbers of girls surveyed were grouped as early, mid and late adolescence according to the age group as shown below:

Table- 1: Age distribution of girls (n = 411)

AGE	FREQUENCY	PERCENT
10-12yrs	133	32.4
13-16yrs	185	45
17-19yrs	93	22.6
TOTAL	**411**	**100**

45% of the girls were in the age group 13-16 yrs and 133 girls were in the age group 10-12.

1.2 Literacy of girls

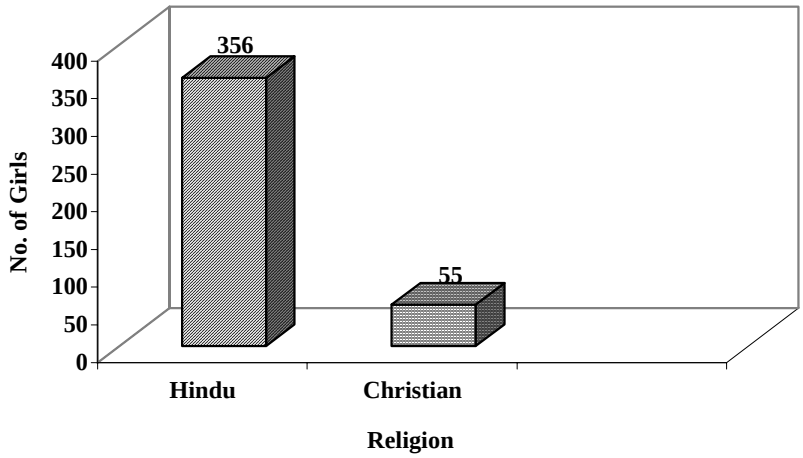
Table – 2: Literacy of girls

EDUCATION	NUMBER	PERCENT
Primary	21	5.1
Middle	319	77.6
High school	65	15.8
Post high school	2	.5
Degree holder	4	1
TOTAL	**411**	**100**

It is important to note that literacy rate was 100% as most of them had completed primary schooling. Only 6 of them had gone for higher studies. 7 (1.8%) of them were working. 64 (15.6%) of them remained at home after their schooling but they carry out the household works.

1.3 Religion

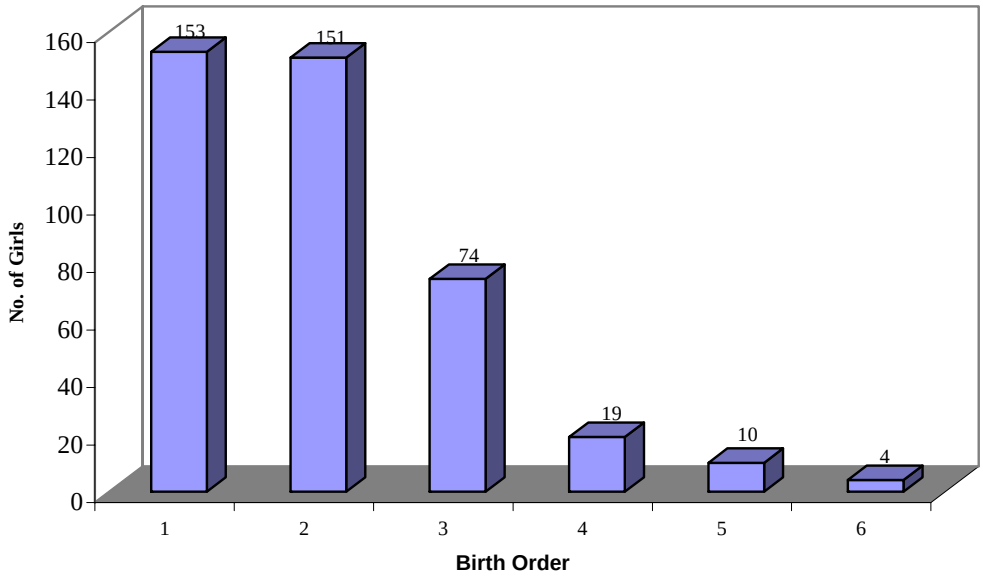
Fig. No.1. No. of Girls by Religion



Majority of the girls were Hindus (86.6%). Others were Christians (13.4%).

1.4 Birth Order

Fig. No. 2 Birth Order



153 girls were of birth order one and 151 were of two.

Birth order of more than 3 still prevails (8%).Highest was 6 that was seen among 4 girls.

1.5 Menstrual Status

188 of the girls had not attained menarche and 223 had attained menarche (54.3%). Mean age of attaining menarche was 13.49yrs (standard deviation-1.36).

64 of the girls (15.6%) had Menstrual problems. 9 of them had dysmennorhoea, 24 of them had menorrhagia and 31of them had irregular bleeding cycles.

1.6 Marital Status

17(4.1%) of the girls were married. There was no finding of early marriage. 7 were married at the age of 18 yrs .10 of them were married at the age of 19. Two of them were in early pregnancy.

1.7 Details of the Father

Table-3: Education of Father (n = 394)

EDUCATION	FREQUENCY
Illiterate	177
Primary	86
Middle	105
High	22
Post high/ degree	4
Total	**394**

177 of the girls' fathers were illiterate. Only 4 of them had gone for higher education. 17 (4.1%) of them did not have their father who had died

2 Occupation

345 (83.9%) of the girls fathers were engaged in agriculture as labourers.49 (11.9%) were employed in other settings.

1.8 Details of the Mother

Table 4: Mothers' Education (n = 399)

EDUCATION	NUMBER
Illiterate	249
Primary	94
Middle	49
High school	7
Total	**399**

249 (60.6%) of the mothers were illiterate but the girls' literacy were 100%.

No mothers had studied beyond high school.

12 of the girls' mothers had died. 4 of them had died during delivery period.

Occupation of Mothers

265(64.5%) of them were agricultural laborers.121 (29.4%) of them remained at home. 13(3.2%) were employed locally.

1.9 Per Capita Income of the Family

Table 5: Per capita income of the family (n=410)

Social Class	PER CAPITA INCOME	NUMBER
I	>1000	0
II	500-999	155
III	300-499	203
IV	151-299	51
V	<150	1
	Total	**410**

Income detail of one girl could not be obtained as both of her parents had expired and she was living with her grand mother. Most of them belonged to social class 2 and 3.

2 Environmental Details

2.1 Type of Family

287(69.8%) girls lived in nuclear family and Others 124(30.2 %) were in the joint family.

2.2 Type of House

178(43.3%) of them lived in kutcha houses and 233 (56.7%) lived in pucca houses.

2.3 Sanitation

361(87.8%) of the girls were practicing open air defecation. Only 50(12.2%) used constructed latrines. Solid wastes were disposed in the open space. There was no organized method of disposal of wastes and girls expressed no particular importance for proper disposal.

2.4 Diet Pattern

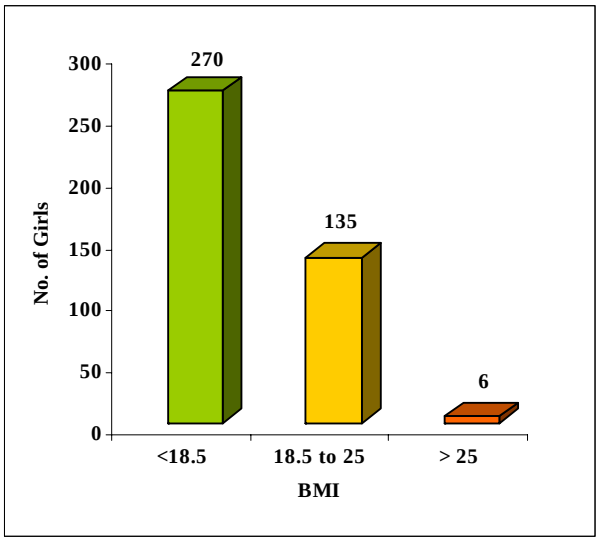
405(98.5%) consumed mixed diet. Most of them consumed whatever was available in the house. No nutritional supplementaries were provided for them.

2.5 Drinking Water

Drinking water supply was through the public taps. Storage of water at home was mostly in mud or plastic pots. Custom of boiling drinking water was absent except in very few houses (only when they were sick). Straining of water was followed in some houses.

2.6 BMI

Fig. 3 BMI



270 girls were under nourished and six were over weight.

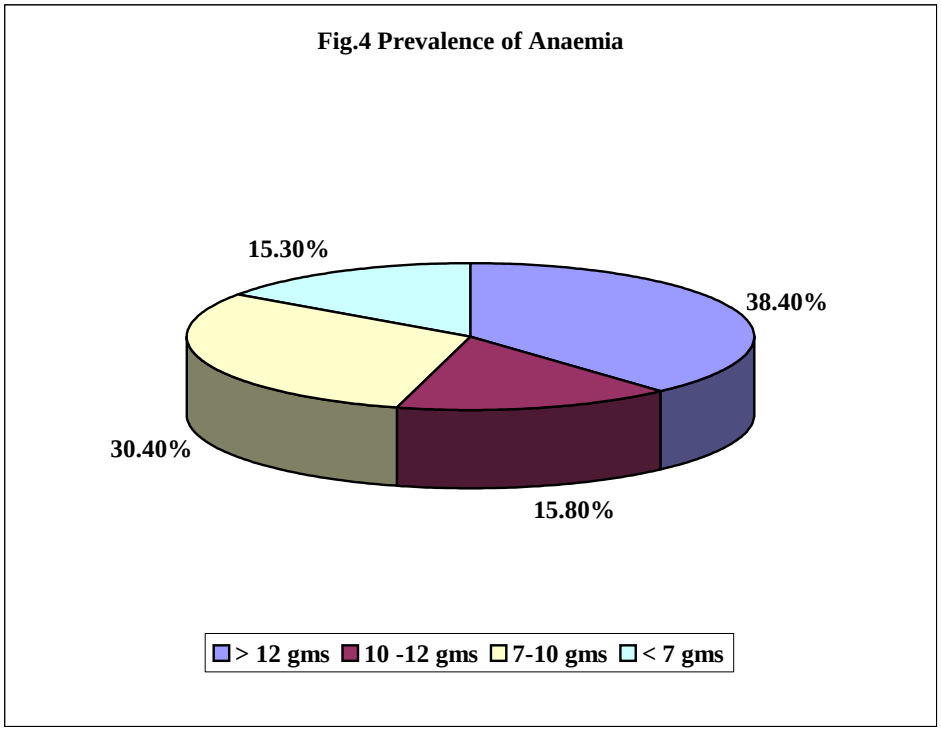
3. Clinical Findings

The observed clinical findings during the interview irrespective of the anaemic status of the girls:

Table 6: Clinical observations

FINDINGS	NUMBER
Upper respiratory infection	22
Impetigo	13
Angular stomatitis	15
Ear discharge	4
Dental caries	16
Bitot's spots	2
Phrenoderma	11
Fungal infection	10
Total	**93**

4 PREVALENCE OF ANAEMIA



The prevalence of anaemia in this study was 61.6%. Confidence interval (56.91-66.29) Prevalence of severe anaemia was 15.3 %. NFHS III (2005-2006) showed a prevalence of 56% of anaemia.

Rana et al [41]and Seshadri et al [42] reported a similar prevalence of 60%and 63% respectively.

Kotecha et al[43], Chaturvedi et al[44] and Agarwal [45] reported a prevalence of 74.7%, 73.7% and 47.6%respectively. These differences may be due to differences in the study area.

4.2 SOCIODEMOGRAPHY OF GIRLS

Table-7: Distribution of level of anaemia by age

Age	Normal No/(%)	Mild anaemia No/(%)	Moderate anaemia No/(%)	Severe anaemia No/(%)	Total No/(%)
10-12 yrs	69 (51.9%)	22 (16.5%)	24 (18.0%)	18 (13.5%)	133 (100%)
13-16 yrs	53 (28.6%)	24 (13.0%)	72 (38.9%)	36 (19.5%)	185 (100%)
17-19 yrs	36 (38.7%)	19 (20.4%)	29 (31.2%)	9 (9.7%)	93 (100%)
Total	**158 (38.4%)**	**65 (15.8%)**	**125 (30.4%)**	**63 (15.3%)**	**411 (100%)**

Chi-square value= 28.491 df-6 p = 0.001

51.9% of the girls of the age group 10-12 yrs were not anaemic.

Age had significant association with the level of anaemia.

As age increases level of anaemia also increases.

Table-7a: Distribution of anaemia by age

AGE	No of girls		Chi square	df	p-value	Odds ratio (95% C.I)
	Anaemic	Normal				
a. 10-12yrs b. 13-16yrs c. 17-19yrs	64 132 57	69 53 36	17.65	2	<0.001	**2.68(1.69-4.28)** (a Vs b) **1.70(1.02-2.92)** (a Vs c)

Chances of having anaemia is 2.6 times higher for the girls in the age group of 13-16 yrs. compared to girls of age group 10-12 yrs. [OR 2.68].

Girls of age group 17-19 yrs. were 1.7 times had higher risk of developing anaemia [OR 1.70].

Raja ratnam et al [46] documented a high prevalence of anaemia (44.8%) among girls of age group 15- 19 yrs. Dallman et al found the prevalence of anaemia in adolescent girls to be highest in 15- 17 yr old , who are menstruating.

4.3 Distribution of anaemia by education

Table – 8: Education and Anaemia

Education	Normal No/(%)	Mild anaemia No/(%)	Moderate anaemia No/(%)	Severe anaemia No/(%)	Total No/(%)
Primary	6 (28.6%)	7 (33.3%)	5 (23.8%)	3 (14.3%)	21 (100%)
Middle	133 (41.7%)	43 (13.5%)	89 (27.9%)	54 (16.9%)	319 (100%)
High school	16 (24.6%)	14 (21.5%)	29 (44.6%)	6 (9.2%)	65 (100%)
•Post high school	1 (50%)	1 (50%)	0 (0%)	0 (0%)	2 (100%)
• Degree	2 (50%)	0 (0%)	2 (50%)	0 (0%)	4 (100%)
Total	**158 38.4%)**	**65 (15.8%)**	**125 30.4%)**	**63 15.3%)**	**411 (100%)**

- Post high school and degree combined for statistical purpose

Chi – square value- 18.17 df – 6 p= 0.006

71.4% of them who had completed primary school were anaemic. 58.3% from the middle school were anaemic. Education had a significant association with the prevalence of anaemia. Girls above high school were very limited in number (6 only) and severity of anaemia was less among them. Kaur et al (2006) in their study did not find any significant association between age, education and anaemia.

4.4 Distribution by occupation, religion & marital status

Table 9: Occupation, Religion and Marital status

Variables	**Normal No/(%)**	**Mild anaemia No/(%)**	**Moderate anaemia No/(%)**	**Severe anaemia No/(%)**	**Total No/(%)**	**Chi-square**	**df**	**P value**
Occupation Employed	3 (42.9%)	1 (14.3%)	3 (42.9%)	0 (0%)	7 100%)	1.501	3	0.682
Un employed	155 (38.4%)	64 (15.8%)	122 (30.2%)	63 (15.6%)	404 (100%)			
Total	158 (38.4%)	65 (15.8%)	125 (30.4%)	63 (15.3%)	411 (100%)			
Religion Hindu	136 (38.2%)	58 (16.3%)	108 (30.3%)	54 (15.2%)	356 (100%)	.472	3	0.925
Christian	22 (40%)	7 (12.7%)	17 (30.9%)	9 (16.4%)	55 (100%)			
Total	158 (38.4%)	65 (15.8%)	125 (30.4%)	63 (15.3%)	411 (100%)			
Marital status						1.577	3	0.665
Married	9 (52.9%)	2 (11.8%)	4 (23.5%)	2 (11.8%)	17 (100%)			
Un married	149 (37.8%)	63 (16%)	121 (30.7%)	61 (15.5%)	394 (100%)			
Total	**158 (38.4%)**	**65 (15.8%)**	**125 (30.4%)**	**63 (15.3%)**	**411 100%)**			

Study showed no significant difference between anaemia and occupation, religion and marital status. Numbers of married girls were 17 and prevalence among them was 47%. Number of the girls employed were 7 and prevalence was 57%. Girls belonging to both religions had a prevalence of 60% .

4.4 Distribution of level of anaemia by menstrual status

Table 10: Menstrual status and level of anaemia

Variable	Normal No/(%)	Mild anaemia No/(%)	Moderate anaemia No/(%)	Severe anaemia No/(%)	Total No/(%)	Chi square	df	P value
Menarche	**(n=411)**					15.228	3	0.002
Not attained	82 (43.6%)	30 (16%)	40 (21.3%)	36 (19.1%)	188 (100%)			
Attained	76 (34.1%)	35 (15.7%)	85 (38.1%)	27 (12.1%)	223 (100%)			
Total	158 (38.4%)	65 (15.8%)	125 (30.4%)	63 (15.3%)	411 (100%)			
Men prob	**(n=223)**					44.538	3	0.001
Yes	8 (12.5%)	4 (6.3%)	33 (51.6%)	19 (29.7%)	64 (100%)			
No	68 (42.8%)	31 (19.5%)	52 (32.7%)	8 (5.0%)	159 (100%)			
Total	76 (34.1%)	35 (15.7%)	85 (38.1%)	27 (12.1%)	223 (100%)			

This study showed a significant association between anaemia and menstrual status. (P 0.002). 65.9% of the girls who had attained menarche were anaemic.87.5% of the girls who had menstrual problems were anaemic. Girls who had menstrual problems had moderate (51.6%) and severe (28.7%) anaemia.

Table 10a: Menstrual status and anaemia

Menstrual status	No of girls		Chi square	df	p-value	Odds ratio (95% C.I)
	Anaemic	Normal				
Menarche			3.92	1	0.048	1.49 (1.03-2.21)
Not attained	106	82				
Attained	147	76				
Men.problem	n=(223)		18.6	1	<0.001	5.23 (2.34-11.6)
Yes	56	8				
No	91	68				

Chances of having anaemia is 1.5 times higher for the girls who had attained menarche compared to girls who had not attained [OR 1.49].

Girls who had any menstrual problems had 5 times higher risk of developing anaemia [OR 5.23].

Table 11: Distribution of level of anaemia by type of menstrual problem (n=64)

Type of problem	Normal No/(%)	Mild anaemia No/(%)	Moderate anaemia No/(%)	Severe anaemia No/(%)	*Total* No/(%)	Chi-square	df	p-value
Dysmeorrhea	4 (44.4%)	1 (11.1%)	3 (33.3%)	1 (11.1%)	9 (100%)	15.828	6	0.015
Menorrhagia	1 (4.2%)	0 (0%)	12 (50%)	11 (45.8%)	24 (100%)			
Irregular	3 (9.7%)	3 (9.7%)	18 (58.1%)	7 (22.6%)	31 (100%)			
Total	8 (12.5%)	4 (6.3%)	33 (51.6%)	19 (29.7%)	64 (100%)			

46% of the girls who had menorrhagia were severely anaemic. 90% of the girls with irregular cycles were anaemic.

Table 11a: Distribution of anaemia by type of menstrual problem

Type of problem	No of girls		Chi square	df	p-value	Odds ratio (95% C.I)
	Anaemic	Normal				
a. Dysmenorrhea b. Menorrhagia c. Irregular cycles	5 23 28	4 1 3	10.95	2	0.006	**18.4(1.6-20.8)** (a Vs b) **7.47(1.27-44)** (a Vs C)

Girls with menorrhagia had 18.4 times higher risk of developing anaemia compared to girls who had dysmenorrhoea [OR 18.4].

Girls with irregular cycles had 7.5 times higher risk of developing anaemia [OR 7.47].

Studies of Kaur et al (2006) and Raja rathnam et al (2000) showed that high menstrual blood loss was associated with increased risk of anaemia (OR-5.65). This further reiterates and emphasizes the corrective measures for anaemia and iron deficiency in girls before they enter adolescence so as to compensate the additional requirements for growth and development during puberty and combat the extra losses during menstruation.[47]

4.5 Parent's Details

Table 12: Distribution of level of anaemia by Father's education and occupation (n-394)

Variable	Normal	Mild anaemic	Moderate anaemia	Severe anaemia	Total	Chi - square	df	p-value
Father's education						6.752	9	0.663
Illiterate	63	26	60	28	177			
Primary	30	17	27	12	86			
Middle	48	14	27	16	105			
• High	11	5	5	5	26			
Total	152	62	119	61	394			
Father's occupation						1.568	3	0.667
Agriculture	131	53	105	56	345			
Others	21	9	14	5	49			
Total	152	62	119	61	394			

- High School and Diploma Combined for statistical purpose

There was no association between father's education, occupation and anaemia. 345 of them were engaged in agriculture and 177 were illiterate.65% of the girls were anaemic among girls who had illiterate fathers. 30.4% of the girls had moderate anaemia and 16% of the girls had severe anaemia whose fathers were engaged in agriculture. Rawat et al (2001) study showed a significant association between occupation of father and prevalence of anaemia (44% &p-.01).

4.6 Details of mother

Table 13: Distribution of level of anaemia Mothers' education and occupation :(n-399)

Variable	Normal	Mild	Moderate	Severe	Total	Chi-square	df	P value
Mother's education						17.892	9	0.036
Illiterate	92	40	76	41	249			
Primary	34	17	31	12	94			
Middle	30	7	8	4	49			
High	0	1	4	2	7			
Total	156	65	119	59	399			
Mother's Occupation						7.555	6	0.273
Agriculture	104	36	83	42	265			
Non agriculture	6	1	5	1	13			
Home maker	46	28	31	16	121			
Total	**156**	**65**	**119**	**59**	**399**			

63% of the girls were anaemic who had illiterate mothers.

Mother's education had been significantly associated with prevalence and severity of anaemia. 16.4% of severe and 30.5% of moderately anaemic girls had illiterate mothers. No mothers had gone beyond high school. Mother's occupation had no association with anaemia.

Rawat et al (2001) studies showed a higher prevalence of anaemia (42.2%and 51.9%) among girls having illiterate and just literate mothers.

4.7 Distribution of anaemia by type of family, Percapita income and birth order

Table 14: Distribution of level of anaemia by Type of family, Percapita income and Birth order

Variables	Normal No/(%)	Mild anaemia No/(%)	Moderate anaemia No/(%)	Severe anaemia No/(%)	*Total* No/(%)	Chi-square	df	p-value
Type of family						1.683	3	0.641
Nuclear	109 (38.0%)	43 (15.0%)	87 (30.3%)	48 (16.7%)	287 (100.0%)			
Joint	49 (39.5%)	22 (17.7%)	38 (30.6%)	15 (12.1%)	124 (100.0%)			
Total	158 38.4%	65 15.8%	125 30.4%	63 15.3%	411 100.0%			
Percapita Income (n-410)						54.21	6	<0.001
• < 150	0	0	1	0	1			
150-299	14	6	9	22	51			
300-499	61	37	75	30	203			
500-999	83	22	39	11	155			
Total	158	65	124	63	410			
Birth order						14.368	9	0.110
One	61 (39.9%)	28 (18.3%)	50 (32.7%)	14 (9.2%)	153 (100.0%)			
Two	63 (41.7%)	22 (14.6%)	39 (25.8%)	27 (17.9%)	151 (100.0%)			
Three	22 (29.7%)	9 (12.2%)	29 (39.2%)	14 (18.9%)	74 (100.0%)			
> 3	12 (36.4%)	6 (18.2%)	7 (21.2%)	8 (24.2%)	33 (100.0%)			
Total	158 (38.4%)	65 (15.8%)	125 (30.4%)	63 (15.3%)	411 (100.0%)			

- (<150 and 150-299 combined for statistical purpose)

Girls of both nuclear and joint family type had a similar prevalence of anaemia (39%) and was not statistically significant.

Anaemia was significantly associated with per capita income of the family.

Table 14a: Distribution of anaemia by Percapita income

Percapita income	No of girls		Chi square	df	p-value	Odds ratio (95% C.I)
	Anaemic	Normal				
a. 150-299	38	14	23.8	2	<0.001	**3.12(1.57-6.23)**
b. 300-499	142	61				(a Vs c)
c. 500-999	72	83				**2.68(1.73-4.15)**
						(b Vs c)

Girls of social class 4 were 3 times more prone for anaemia compared to girls belonging to social class 2 [OR 3.12].

Girls of social class 3 were 2 times more prone for anaemia compared to girls of social class 2 [OR 2.68].

Birth order of more than three was present in 33 girls.

24% of the girls of birth order more than three were severely anaemic. where as 9% of the girls of birth order 1 were severely anaemic. 70% of girls of birth order 3 were anaemic though no statistical significance was seen between birth order and anaemia.

Similar association was found in the studies of Kaur et al (2006) and Gwarika et al. (2006) where higher prevalence of 73.4% and 96.5% of anaemia were present in lower socio economic group girls.

4.8 Distribution of anaemia by type of house, diet, sanitation & BMI

Table 15: Distribution of level of anaemia by type of house, diet, sanitation & BMI

Variables	Normal No/(%)	Mild anaemia No/(%)	Moderate anaemia No/(%)	Severe anaemia No/(%)	*Total* No/(%)	Chi-square	df	p-value
Type of house						14.830	3	0.002
Kutcha	52 (29.2%)	34 (19.1%)	67 (37.6%)	25 (14.0%)	178 (100.0%)			
Pucca	106 (45.5%)	31 (13.3%)	58 (24.9%)	38 (16.3%)	233 (100.0%)			
Total	158 (38.4%)	65 (15.8%)	125 (30.4%)	63 (15.3%)	411 (100.0%)			
Sanitation						11.756	3	0.008
Open air	131 (36.3%)	54 (15.0%)	115 (31.9%)	61 (16.9%)	361 (100.0%)			
Constructed	27 (54.0%)	11 (22.0%)	10 (20.0%)	2 (4.0%)	50 (100.0%)			
Total	158 (38.4%)	65 (15.8%)	125 (30.4%)	63 (15.3%)	411 (100.0%)			
Type of diet						5.907	3	0.116
Veg	1 (16.7%)	1 (16.7%)	1 (16.7%)	3 (50.0%)	6 (100.0%)			
Mixed	157 (38.8%)	64 (15.8%)	124 (30.6%)	60 (14.8%)	405 (100.0%)			
Total	158 (38.4%)	65 (15.8%)	125 (30.4%)	63 (15.3%)	411 (100.0%)			
BMI						11.623	6	0.071
<18.5	105 (38.9%)	41 (15.2%)	76 (28.1%)	48 (17.8%)	270 (100.0%)			
Normal	51 (37.8%)	21 (15.6%)	49 (36.3%)	14 (10.4%)	135 (100.0%)			
>25	2 (33.3%)	3 (50.0%)	0 (0%)	1 (16.7%)	6 (100.0%)			
Total	158 (38.4%)	65 (15.8%)	125 (30.4%)	63 (15.3%)	411 (100.0%)			

Among the girls who lived in the kutcha houses, 72% of the girls were anaemic.

Table 15a: Distribution of anaemia by type of house, diet, sanitation & BMI

Variables	No of girls		Chi square	df	p-value	Odds ratio (95% C.I)
	Anaemic	Normal				
Type of house			11.3	1	<0.001	2.2(1.3-3.05)
Kutcha	126	52				
pucca	127	106				
Sanitation			5.8	1	0.016	2.06(1.13-3.75)
Open air	230	131				
constructed	23	27				
BMI			0.114	2	0.945	**0.95 (0.685-1.604)**
a. <18.5	165	105				(a Vs b)
b. Normal	84	51				**1.21 (0.215-6.86)**
c. >25	4	2				(b Vs c)

Girls who lived in Kutcha houses had 2.2 times higher risk of developing anaemia than girls who lived in pucca houses [OR 2.2].

64% of the girls who practiced open air defecation had anaemia. 32% of the girls had moderate anaemia and 17% of the girls had severe anaemia.

Girls who practiced open air defaecation had 2 times higher risk of developing anaemia [OR 2.06].

Only 6 girls consumed vegetarian diet and prevalence of severe anaemia among them was 50% though statistically no significance exists between diet and anaemia. 65% of the girls were under nourished and 18% of the girls with BMI less than 18.5 were severely anaemic. BMI did not show any significant association with anaemia.

Verma et al quoted that compared to non vegetarians (38%) more vegetarians (65.9%) were anaemic. Kaur et al (2006) stated that vegetarian diet was a strong predictor for prevalence of anaemia (OR-5.83).

SUMMARY

This study done at Ponthavakkam Health Sub centre among adolescent girls of age 10-19 yrs showed a prevalence of anaemia as 61.6% (CI 56.91-66.29) which was quite high. Moderately anaemic were 30.4% and severely anaemic were 15.3%.

Age was significantly associated with anaemia. 48.1% of the girls in the age group 10-12yrs, 71.4% of the girls in the age group 13-16yrs and 61.3% of the girls in the age group 17-19 yrs were anaemic.

Education also had a significant association with anaemia. 71.4% of the girls who had completed primary schooling were anaemic.

Occupation, religion, marital status, diet pattern and BMI did not show any significance with anaemia.

Father's education, occupation, mother's occupation, type of family and birth order revealed no significance with anaemia. Mother's literacy and per capita income of the family influenced the prevalence of anaemia.59% of the girls were anaemic whose mother's were illiterate.

Type of house and sanitation showed significant association with anaemia. 64% of the girls who practiced open air defeacation were anaemic. Prevalence of anaemia was found to be higher (65.9%) among girls who had attained menarche and who had menstrual problems (87.5%). Severity of anaemia depended upon type of menstrual problem.95% of the girls who had menorrhagia were anaemic.

CONCLUSION

Though there are many programmes for prophylaxis of anaemia, the prevalence of 61.6% of anaemia is quiet high which indicates the need for effective implementation for prevention of anaemia at this age group.

Almost all the girls had completed primary schooling. Education about anaemia and measures to prevent it at the schools could be a practical approach of controlling anaemia. A base line hematocrit examination and periodical follow-up every year till they complete the school would help in combating anaemia.

Most of the girls consumed noon meals at schools, education about the healthy diet and iron rich foods through the teachers would help in preventing nutritional anaemia.

During the school health visits, girls shall be encouraged to tell their menstrual problems if any.

The medical officers of PHCs should know the importance of an easily preventable public health problem and shall take interest in imparting knowledge to the girls and also to the health workers. Shall also ensure the regular supply of IFA tablets that are distributed prophylactically.

VHNs shall be trained in picking up the anaemic cases at an earlier stage and referring the needed to the medical officer at PHCs to evaluate the cause of anaemia.

If sanitation and socio economic conditions are improved the anaemia prevalence shall be reduced to a greater extent.

Mothers shall be educated through the self help groups about nutrition and sanitation.

LIMITATIONS

1. This is a cross-sectional study covering a single health sub centre only. Due to logistics all the health sub centres could not be covered.

2. Worm infestation an important cause for anaemia was not elicited in detail as it requires confirmation by stool examination which was not possible to-do simultaneously.

3. Dietary history was limited to whether vegetarians or mixed diet consumers. It could not be elaborated in detail due to time constraints.

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QUESTIONNAIRE

1. Name ID No:

2. Age

3. Address:

4. Education:
    1. Iliterate
    2. Primary
    3. Middle
    4. High school
    5. Post high school/ Diploma
    6. Degree

5. OCCUPATION:
    1. Working
        1a. Nature of work
        1b. Income
    2. Not working

6. RELIGION:
    1. Hindu
    2. Christian
    3. Muslim

7. BIRTH ORDER: 1/2/3/4…
    1 No of brothers
    2: No of sisters

8. TYPE OF FAMILY.
    1. Nuclear family
    2. Joint family

9. Parents Details

	EDUCATION	OCCUPATION	INCOME
1. Father			
2. Mother			

10. Total no of family members

11. Per capita income of the family

12. Type of the house
    1. Kutcha house
    2. Pucca house

13. Toilet facility
    1. Open air
    2. Constructed latrine

14. Nature of diet:
    1. Vegetarian
    2. Mixed diet

15. Menstrual history:
    1. Not attained
    2 Attained

    If Yes At What Age - Yrs

    16. Do you have any menstrual problem?
    1-Yes 2- No
    If yes specify:

17. Marital Status:
    1. Yes
    2. No.
    IF YES MARRIED SINCE: yrs

18. Physical measurements:

    WT: kg
    HT: meters.
    BMI:

19. Clinical findings:

20. Hb estimation :

கேள்வி படிவம்:

1. பெயர் அடையாள எண். ☐

2. வயது

3. முகவரி

4. படிப்பு ☐

    1. படிக்காதவர்
    2. ஆரம்ப கல்வி
    3. நடுநிலைப் பள்ளி
    4. உயர்நிலை பள்ளி
    5. மேல்நிலை / இளம் கலை
    6. முதுகலை கல்வி

5. வேலைக்கு செல்பவரா? ☐

    1. ஆம்
    1. அ. வேலையின் தன்மை
    1. ஆ. வருமானம்
    2. இல்லை

6. மதம் ☐

    1. இந்து
    2. கிறித்துவம்
    3. முஸ்லீம்

7. பிறப்பு வரிசை 1/2/3/4.... ☐

    7.அ. சகோதரர்களின் எண்ணிக்கை ☐

    7.ஆ. சகோதரிகளின் எண்ணிக்கை ☐

8. குடும்ப தன்மை ☐

   1. தனி குடும்பம்
   2. கூட்டு குடும்பம்

9. பெற்றோர்

	படிப்பு	வேலை	வருமானம்
1. தந்தை			
2. தாய்			

10. குடும்ப நபர்களின் மொத்த எண்ணிக்கை ☐

11. குடும்ப விகித வருமாணம் ☐

12. வீட்டின் தன்மை ☐

   1. குடிசை வீடு
   2. தளம் வீடு

13. கழிப்பறை வசதி ☐

   1. திறந்த வெளி
   2. முறையான கழிவறை

14. உணவு முறை ☐

   1. சைவம்
   2. சைவம் மற்றும் அசைவம்

15. மாதவிடாய் தன்மை ☐

   1. அடையாதவர் 2. அடைந்தவர்

   அ. எந்த வயதில் .....

16. மாதவிடாயில் பிரச்சனை உள்ளதா □

1. ஆம்
அ. எனில் எவ்வகை .....
2. இல்லை

17. திருமணம் ஆனவரா □

1. ஆம்
2. இல்லை

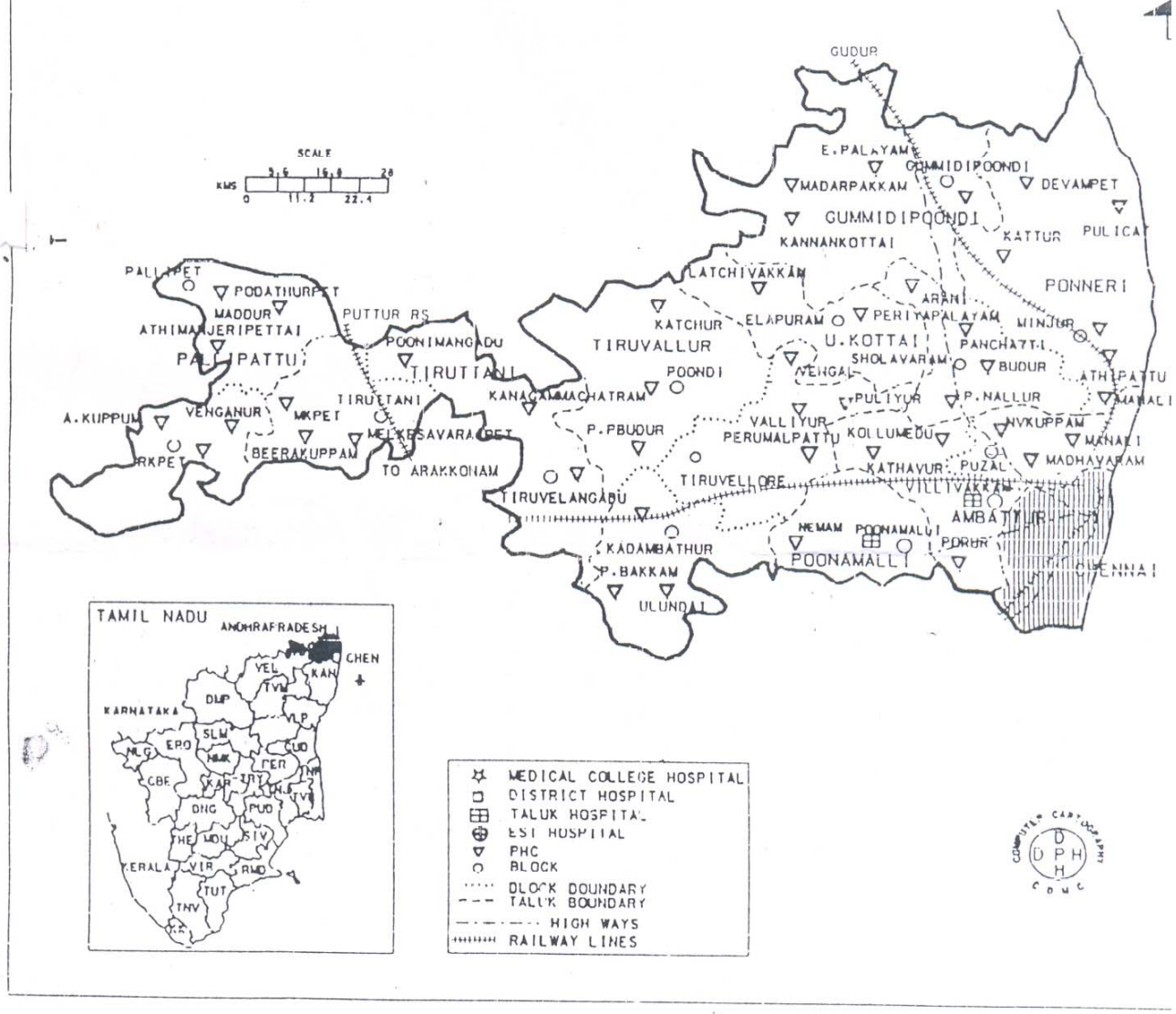
18. உடற்கூறு அளவுகள்

எடை :
உயரம் :
BMI :

19. Clinical finding

20. குருதி அளவு

TIRUVALLUR DISTRICT



INSTITUTIONAL ETHICAL COMMITTEE
GOVERNMENT GENERAL HOSPITAL & MADRAS MEDICAL COLLEGE,
CHENNAI-600 003.

(11)

Telephone: 044-2530 5000
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K.Dis.No.43781P & D3/Ethies/Dean/GGH/08 Dated: 24/11/2008

Title of the work : A CROSS-SECTIONAL STUDY OF PREVALANCE OF ANAEMIA AMONG RURAL ADOLESCENT GIRLS OF TAMILNADU

Principal Investigator : Dr. M. VIJAYALAKSHMI M.D CPM Jr.

Department : Institute of Community Medicine.

The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 25.11.2005 at 2 P.M in Government General Hospital, Deans, Chamber, Chennai-3.

The members of the Committee, the Secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The principal investigator and their term are directed to adhere the guidelines given below:

1. You should get detailed informed consent from the patients/participants and maintain confidentiality.
2. You should carry out the work without detrimental to regular activities as well as without extra expenditure to the Institution or Government.
3. You should inform the IEC in case of any change of study procedure, site and investigation or guide.
4. You should not deviate form the area of the work for which I applied for ethical clearance.
5. You should inform the IEC immediately, in case of any adverse events or serious adverse reactions.
6. You should abide to the rules and regulations of the institution(s)
7. You should complete the work within the specific period and if any extension of time is required, you should apply for permission again and do the work.
8. You should submit the summary of the work to the ethical committee on completion of the work.
9. You should not claim funds from the Institution while doing the work or on completion.
10. You should understand that the members of IEC have the right to monitor the work with prior intimation.

SECRETARY
IEC, GGH,CHENNAI

CHAIRMAN
IEC, GGH,CHENNAI

DEAN
GGH &MMC, CHENNAI

Rkm.5.9(2)

HAEMOGLOBIN ESTIMATION BY CYAN METHAEMOGLOBIN METHOD

PRINCIPLE

The blood is diluted in Drabkin's diluting fluid which **HEMOLYSES THE RED CELLS, CONVERTING THE Hb into cyanmethaemoglobin**. The solution obtained is examined in a calorimeter. Its absorbance is proportionate of the amount of hemoglobin in the blood. This gives the most accurate Hb estimation.

CONTENTS:

The contents of Drabkins fluid :

Potassium ferricyanide	200mg
Potassium cyanide	50mg
Water	1 litre.

METHOD:

1. Draw capillary blood to the .02 ml mark of shali's pipette.
2. Add .02 ml of blood to 5 ml of diluent.
3. Stopper the tube containing the solution and invert it several times.
4. Allowed to stand at room temperature for sufficient time for completion of reaction.
5. The solution is ready to be compared with the standard and reagent blank in a calorimeter at 540 nm with suitable filter. The absorbance of the test sample must be measured with in 6 hours of its being diluted.

CALCULATION:

$$\frac{A^{540} \text{ of test sample}}{A^{540} \text{of standard}} \times \frac{\text{dilution factor}}{1000} \times \text{Concentration of STD}$$

EXAMPLE:

A^{540} of the blood sample is 24, then the Hb% of that sample is calculated as follows.

A^{540} of STD –36

Dilution factor – 251 when .02ml of blood is diluted with 5 ml of drabkin's diluting fluid.

Concentration of standard: 60 mg/ ml

$$= \frac{24 \times 251 \times 60}{36 \times 1000}$$

=10.04 gms/dl